

NSI DIGITAL DIMMING SYSTEM

DDS 86/88/96/9800 DIMMER PACKS

INSTALLATION AND OPERATION GUIDE

Software Revision 1.41, Version C UL, Mfg Q3/96, and above

SPECIFICATIONS

Number of Channels:	86/9600 : 6 channels 88/9800 : 8 channels
Output capacity:	86/8800 : 1200 watts (120v) per channel. 96/9800 : 2400 watts (120v) per channel.
Input Power:	8600 : 120/208 V ac, 3 phase, 4 wire 20 A or 120/240 V ac, 1 phase, 3 wire 30 A 8800 : 120/240 V ac, 1 phase, 3 wire 40 A 9600 : 120/208 V ac, 3 phase, 4 wire 40 A or 120/240 V ac, 1 phase, 3 wire, 60 A 9800 : 120/240 V ac, 1 phase, 3 wire, 80 A
Dimmer control system:	Microprocessor digital phase control dimming or zero-crossing relay mode.
Load filtering:	~ 500us rise time.
Control Input Types:	0 - 10VDC each channel on 9 pin "D" connector. MICROPLEX multiplex signal (128 channel) on three pin XLR type connector. DMX-512 digital signal (512 channel) on five pin XLR optional.
Control Wiring:	Class 2 low voltage.
Output Connections:	NEMA 5-15 or 5-20 duplex per ch. standard. Several other types are optional.
Cooling System:	Thermostatically controlled variable speed fan- forced air with intake on front panel, exhausting on sides of dimmer.

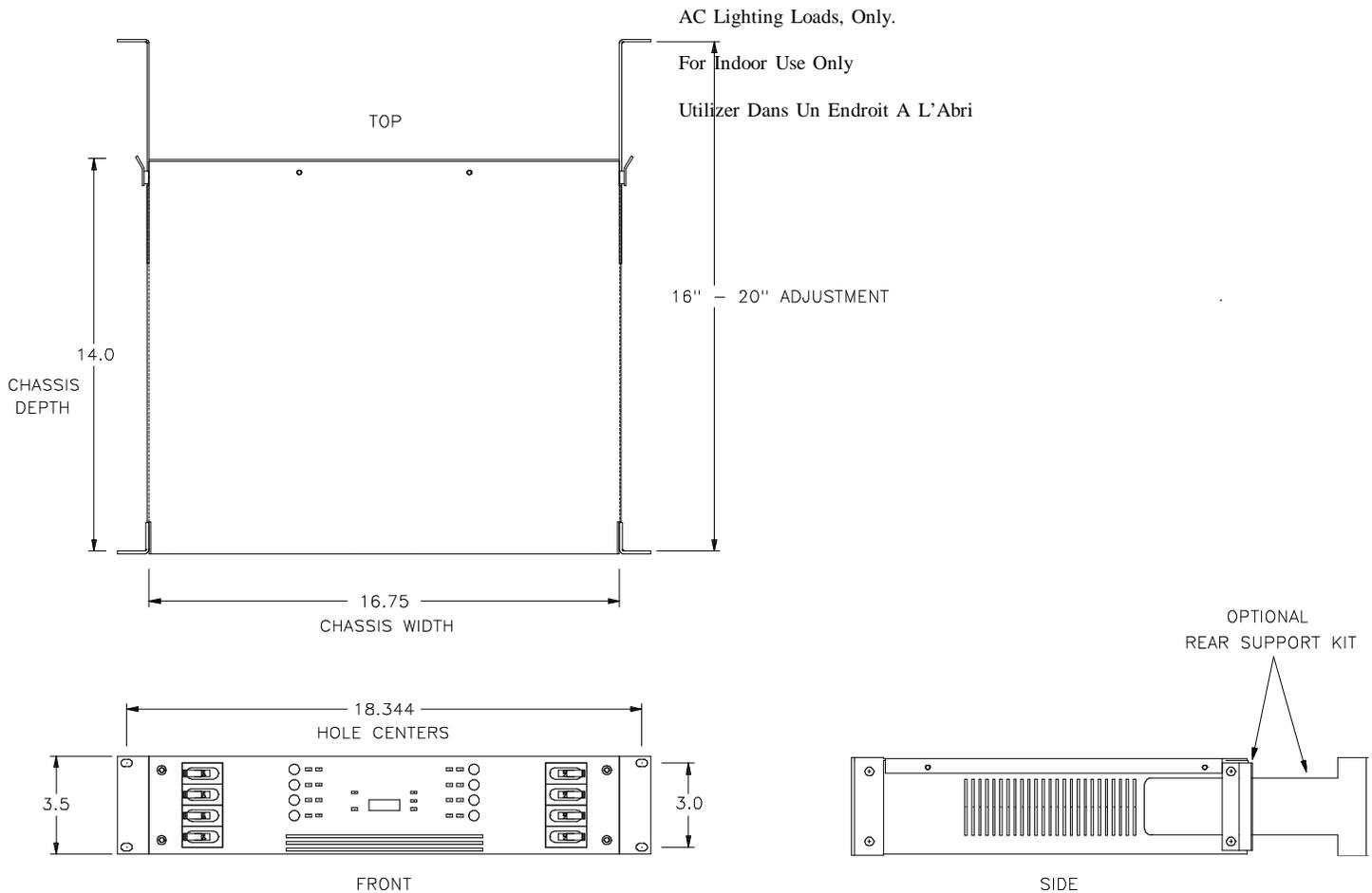
MOUNTING

The NSI DDS rack mountable dimmers are designed to be mounted in a standard 19" EIA rack. The packs are provided with two mounting flanges or "ears" designed for securing to the front rack mounting rails.

The optional REAR SUPPORT KIT must be used in all cases where the rack is portable and prone to bumps and rough handling.

The NSI DDS rack dimmers depend upon forced air cooling. **The rack enclosure shall allow a 2 in. clearance on each side of the dimmer to insure adequate air exhaust.** In some cases where exhaust air flow is obstructed, additional exhaust fans should be used to remove hot air from the rack. Free flow of room air to the front of the dimmer packs must be insured. Any front cover on the rack must be removed during operation. Keep the air vents located on the front and each side of the dimmer pack clear of dust or any obstructions.

If units are to be operated in a small enclosed room, adequate ventilation must be provided to prevent the room temperature from exceeding 100 degrees fahrenheit



INPUT POWER WIRING

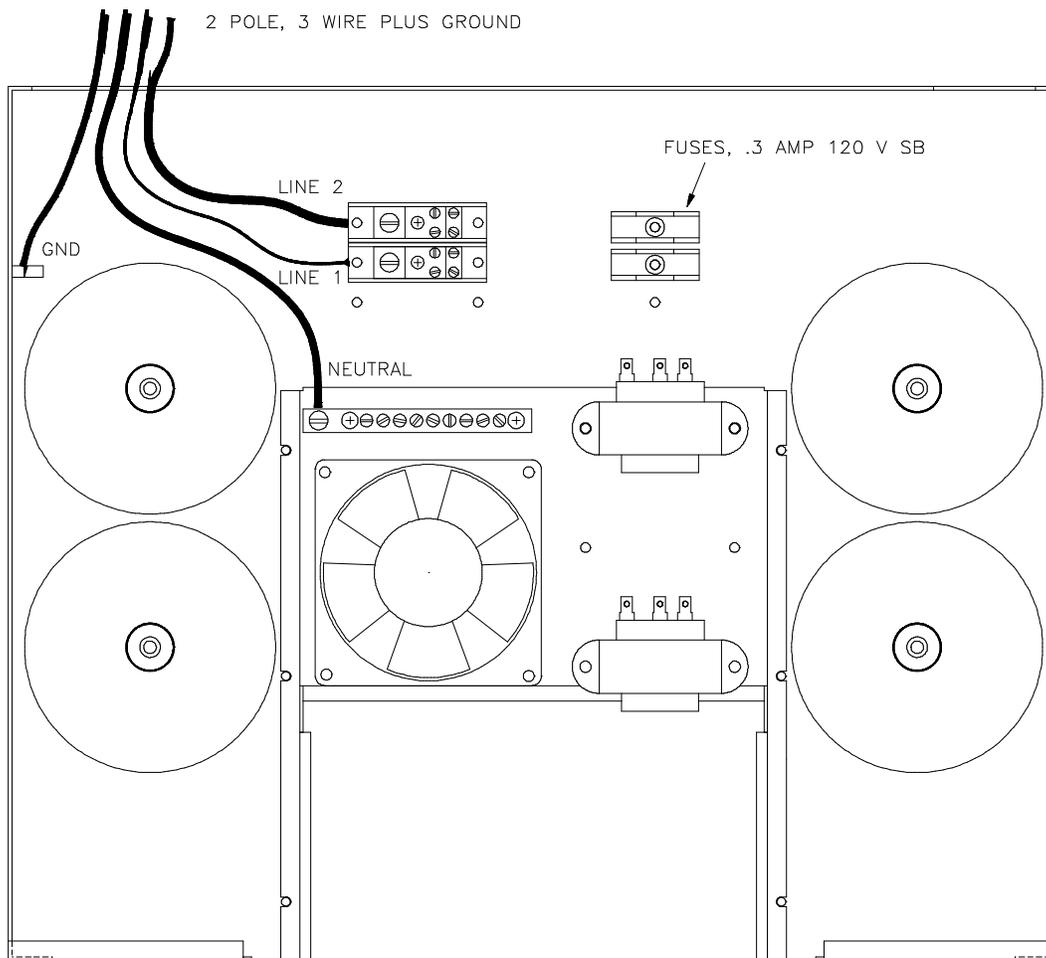
The NSI DDS rack dimmers must be provided with a proper electrical service as listed below:

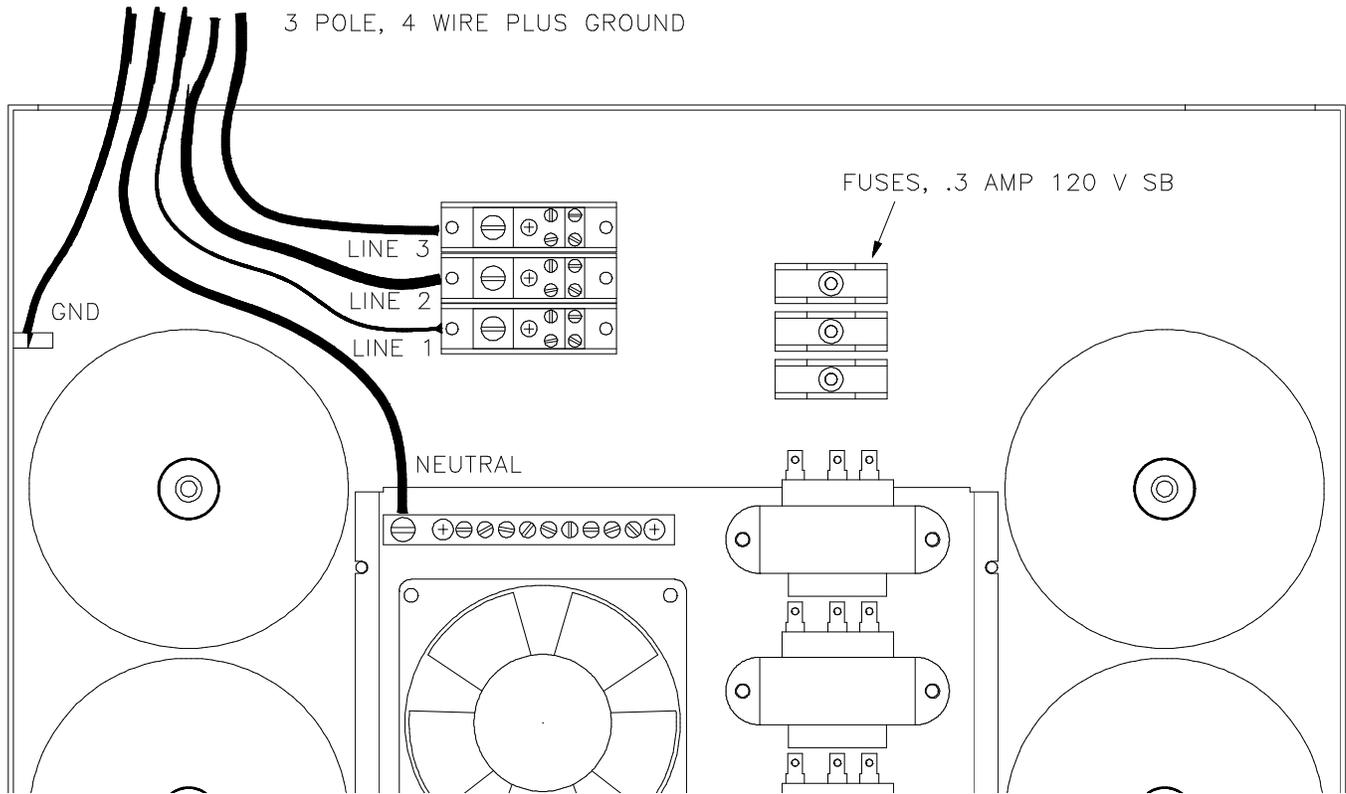
- *8600 : 120/240 VAC 20 amp 3 pole 4 wire plus ground (use minimum #10 AWG) or 120/240 VAC 30 amp 2 pole 3 wire plus ground (use minimum #8 AWG).
 - 8800 : 120/240 VAC 40 amp 2 pole 3 wire plus ground only (use minimum #6 AWG).
 - *9600 : 120/240 VAC 40 amp 3 pole 4 wire plus ground (use minimum #4 AWG) or 120/240 VAC 60 amp 2 pole 3 wire plus ground (use minimum #4 AWG).
 - 9800 : 120/240 VAC 80 amp 2 pole 3 wire plus ground only (use minimum #2 AWG).
- * Unit set up for 3 pole 4 wire - for 2 pole 3 wire operation see Service Manual.**

Input wiring must be copper wire rated at least 90C and must be protected by a suitable branch circuit breaker. Wire sizes show above in parenthesis are for type S, SO, or similar cords. Other types of cords or cables should be sized according to local electrical codes.

All wiring should be done by qualified personnel only!

WARNING: Do not connect chassis ground to NEUTRAL or operate without a chassis ground. To do so may allow exposure to potentially lethal voltage levels and will void the warranty on this product.



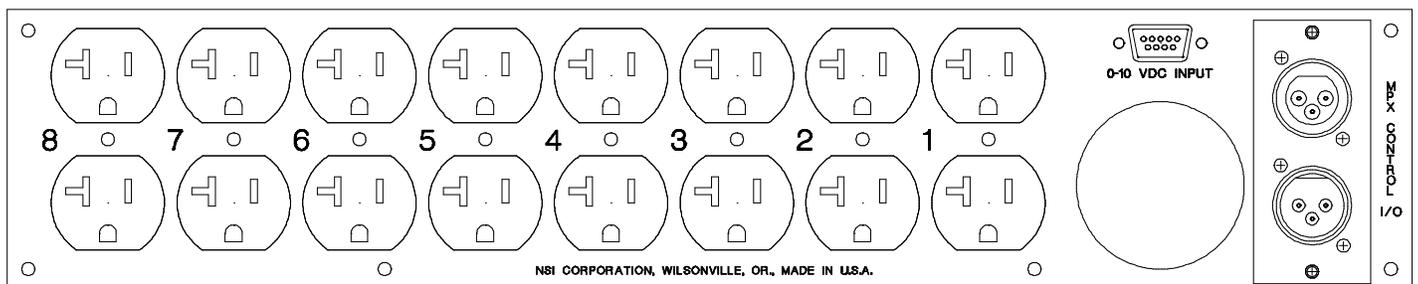


AC OUTPUT RECEPTACLES

The standard version of the DDS rack dimmers have two AC output receptacles for each channel. These receptacles provide power to the lamps in your lighting system. The amount of power supplied to these outlets controls the intensity of the lamps connected.

The total lamp wattage connected to each channel must not exceed the rating of each channel (see specifications). Most 120VAC lamps and fixtures and some transformer type low-voltage fixtures may be connected to these outlets, **DO NOT** connect motors or fluorescent lighting to these outlets when the channel is operating in dimmer mode.

NOTE: Some inductive type loads such as transformers, ballasts, and motors, with poor power factor may cause the dimmer to output D.C. type current. This may cause the load to draw excessive current and overheat, causing damage to the transformer, ballast, or motor. For this reason, it is necessary to insure any inductive loads are fused individually for their respective normal operating current.

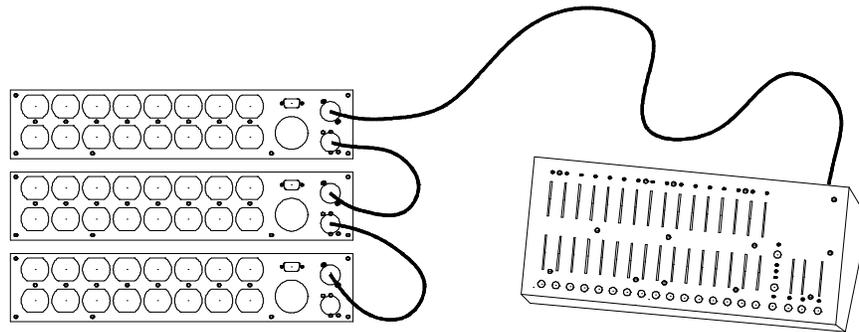


MICROPLEX MULTIPLEX CONTROL WIRING

Microplex is the control protocol used on most NSI lighting consoles. This system uses a single three conductor cable to transmit up to 128 channels of dimmer control. For short distances (50 feet or less) a standard microphone cable may be used to carry both the control signal and the DC power source for NSI control consoles. Longer distances may be accommodated with 18 gauge or better cable to reduce voltage losses of the power supply.

Connect the Microplex control cable to either of the three pin XLR jacks. Since both jacks are wired in parallel, another control cable may be connected between the remaining jack and another dimmer pack. Many dimmer packs may be "daisy chained" together in this manner.

Be sure to set the Channel Address dip switch as required (see MPX ADDRESS SWITCH SETTINGS).



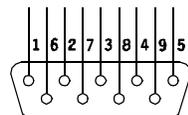
MICRO- PLEX DAISY CHAIN

ANALOG 0 - 10 VDC CONTROL WIRING.

Each of the dimmer channels of the NSI DDS rack dimmer pack may be operated by an analog 0 - 10 VDC control voltage. This type of control will provide 0% intensity at 0 volts and 100% intensity at 10 volts. Any or all of the DDS rack dimmer channels may be operated in this manner simultaneously with any multiplex control input. Each dimmer will respond to the greater of any control inputs.

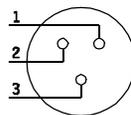
The analog control input uses a standard 9 pin "D" connector which is available from most electronics and computer supply houses. Connect each of the positive channel control wires to the desired dimmer channel input pins (see diagram below) of the plug. Connect the common (ground) control wire to the pin indicated on the diagram. Consult the documentation of the analog control console or device you are using for the proper connections. The control input impedance is 4.7K ohms.

When using analog inputs, Dipswitch #10 should be in the up position to disable Channel Level Memory.



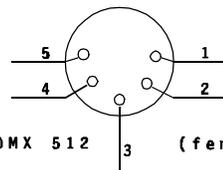
Analog input

- 9: common
- 1: chan 1
- 2: chan 2
- 3: chan 3
- 4: chan 4
- 5: chan 5
- 6: chan 6
- 7: chan 7
- 8: chan 8



Microplex (female)

- 1: common
- 2: +15v
- 3: data



DMX 512 (female)

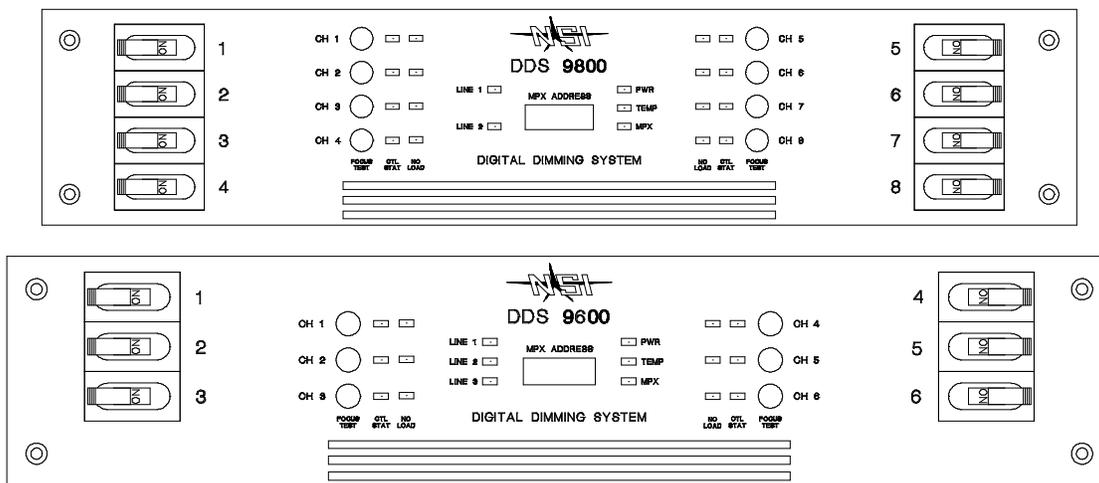
- 1: common
- 2: data -
- 3: data +
- 4-5: not used

DMX 512 multiplex control wiring

DMX 512 is the United States Institute of Theater Technology (USITT) standard for the digital control of dimmers. NSI DDS Dimmer products can be converted from Microplex to DMX 512 digital multiplex with a simple kit available from your dealer.

DMX-512 is the preferred type of control wiring when many dimmer channels are used, because of the high update rate and the resistance to interference. It is recommended in locations subject to electrical noise. DMX-512 only requires 3 wires to transmit lighting levels for as many as 512 dimmer channels. Most of the NSI lighting control consoles can optionally use this interface.

Connect the DMX 512 cable from the control console to the male input connector. Another cable may be connected from the female connector to the male connector on another pack. Many dimmer packs may be "daisy chained" and connected together in this manner. Be sure to set the Channel Address dip switch as required (see MPX ADDRESS SWITCH SETTINGS).



LED INDICATORS

PWR (Green) - Indicates the +5 volt power supply of the dimmer is operating.

LINE 1, 2, 3 (Green) - Indicates the respective pole of the input power is energized. A blown fuse on an internal power supply transformer may cause one of these LEDs to not light. When a 3 pole dimmer is wired for 2 pole operation, the LINE 2 LED will **not** light.

MPX (Green) - Indicates presence of multiplex signal when steady.

TEMP (Red) - Steady indicates the dimmer is too hot and is preparing to shut down. Flashing indicates the dimmer has reduced levels or is shutting down in order to lower internal operating temperatures. (See FAN OPERATION and OVER TEMPERATURE.)

CTL STAT (Green) Indicates the relative control level for each channel.

NO LOAD (Yellow) Steady indicates the absence of a load on a particular channel output. This may be due to no connection to the output or a faulty lamp. Flashing of the NO LOAD LED indicates that the respective channel is in the Focus Test Mode and is forced to full intensity.

NOTE: Load "sensing" does not operate when the dimmer channel is above 75% intensity or in the Focus Test mode. The No Load indicator is only reliable when the dimmer channel control is off or below 75% and the respective circuit breaker is on.

LAMP FOCUS TEST

Pressing the FOCUS TEST button for any channel will force the control for that channel to full on and cause the NO LOAD LED to flash. Pressing the button a second time will cause the channel to return to normal control.

CHANNEL CIRCUIT BREAKERS

Each channel is protected by a magnetic circuit breaker to help prevent overloading the power control devices used in the dimmer. These circuit breakers also function as master power switches for each channel.

Note: Lamps may sometimes cause a temporary “short-circuit” when the filament burns out and cause the circuit breaker to trip. This is normal and protects the internal dimmer circuitry from damage.

CHANNEL LEVEL MEMORY.

Whenever dipswitch #10 is in the off (down) position and there is a loss of multiplex signal detected, all channel outputs will remain at the last received intensity level. If dipswitch #10 is in the up position, all lights will go out on loss of multiplex. The automatic sequencing feature must be disabled for Channel Level Memory to operate (see INTERNAL JUMPER / DIPSWITCH SELECTIONS).

FAN OPERATION and OVER TEMPERATURE

The NSI DDS rack dimmer packs employ a highly efficient cooling system and variable speed temperature controlled fan which functions as follows:

- When the dimmer pack is first powered up the fan will immediately come to full speed for two seconds for self test and then will shut off providing the dimmer is at room temperature.
- **(NOTE: The fan may run at very low speed when dimmer is idle and at room temperature.)**
- As the dimmer pack warms up when lighting loads are turned on, the fan will turn on at a slow speed and gradually increase in speed as more cooling is needed. This reduces unnecessary fan noise and dust collection.
- If for some reason the dimmer airflow is blocked or inadequate the TEMP LED will light.
- If temperature rises any further, the dimmer will attempt to reduce all lighting levels by 25% increments in order to reduce temperature. The TEMP LED will start flashing.
- If internal temperature still rises, a thermostat will shut off all output. The TEMP LED will flash.

Overheating of the dimmer is not normal and may be due to restriction of air circulation, or fan failure.

To adjust the temperature sensing of the DDS 88/9800(**86/9600**) dimmers please see below;

IMPORTANT: BE SURE DIMMER PACK AT ROOM TEMPERATURE!!

1. Activate the calibration mode by holding down focus test switches 4 and 8 (**3 and 6**) together for about 6 seconds. You will notice the fan runs at high speed , the line indicator LEDs begin to flash and the temp LED is on. NOTE: If the temp led is off no calibration is required.
2. Press focus test switch 2 (**1**) if calibration is low or focus test switch 3 (**2**) if high. You will notice the temp load indicator LED should go off indicating proper calibration.
3. Press focus test switch 4 and 8 (**3 and 6**) together to exit the temperature calibration mode.

MPX ADDRESS SWITCH SETTINGS

When using any of the multiplex control systems the dip switches on the front panel of the DDS rack dimmer must be set to assign the desired dimmer channels. The switches set the dimmer pack's starting address to any channel from 1 to 512 (128 for Microplex). See the following chart for settings.

For channels 1 - 128 set dipswitch #8 and #9 off and #1-7 as below.

Starting Ch.	1234567	Starting Ch.	1234567	Starting Ch.	1234567
1	0000000	2	1000000	3	0100000
4	1100000	5	0010000	6	1010000
7	0110000	8	1110000	9	0001000
10	1001000	11	0101000	12	1101000
13	0011000	14	1011000	15	0111000
16	1111000	17	0000100	18	1000100
19	0100100	20	1100100	21	0010100
22	1010100	23	0110100	24	1110100
25	0001100	26	1001100	27	0101100
28	1101100	29	0011100	30	1011100
31	0111100	32	1111100	33	0000010
34	1000010	35	0100010	36	1100010
37	0010010	38	1010010	39	0110010
40	1110010	41	0001010	42	1001010
43	0101010	44	1101010	45	0011010
46	1011010	47	0111010	48	1111010
49	0000110	50	1000110	51	0100110
52	1100110	53	0010110	54	1010110
55	0110110	56	1110110	57	0001110
58	1001110	59	0101110	60	1101110
61	0011110	62	1011110	63	0111110
64	1111110	65	0000001	66	1000001
67	0100001	68	1100001	69	0010001
70	1010001	71	0110001	72	1110001
73	0001001	74	1001001	75	0101001
76	1101001	77	0011001	79	1011001
79	0111001	80	1111001	81	0000101
82	1000101	83	0100101	84	1100101
85	0010101	86	1010101	87	0110101
88	1110101	89	0001101	90	1001101
91	0101101	92	1101101	93	0011101
94	1011101	95	0111101	96	1111101
97	0000011	98	1000011	99	0100011
100	1100011	101	0010011	102	1010011
103	0110011	104	1110011	105	0001011
106	1001011	107	0101011	108	1101011
109	0011011	110	1011011	111	0111011
112	1111011	113	0000111	114	1000111
115	0100111	116	1100111	117	0010111
118	1010111	119	0110111	120	1110111
121	0001111	122	1001111	123	0101111
124	1101111	125	0011111	126	1011111
127	0111111	128	1111111		

For channels 129 - 256 Set dipswitch 1-7 as above and set dipswitch #8 on and #9 off.

For channels 257 - 384 Set dipswitch 1-7 as above and set dipswitch #8 off and #9 on..

For channels 385 - 512 Set dipswitch 1-7 as above and set dipswitch #8 and #9 on.

For dipswitch # 10 setting see CHANNEL LEVEL MEMORY.

INTERNAL JUMPER / DIPSWITCH SELECTIONS

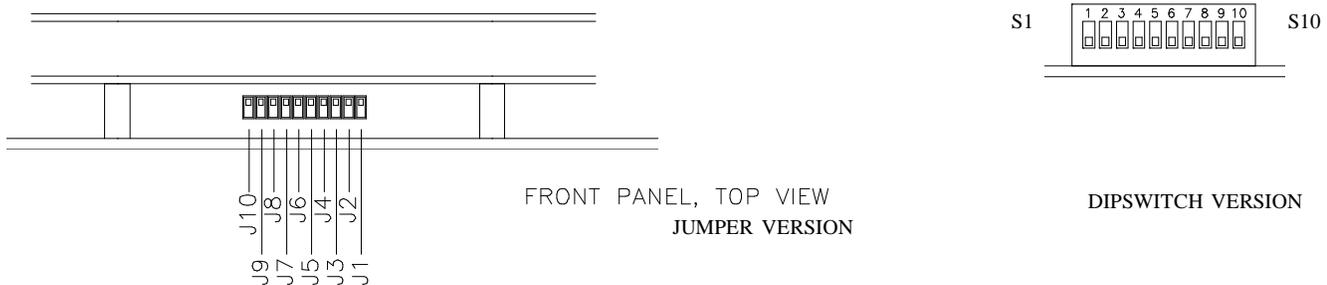
Caution: The follow procedures should be performed by qualified personnel only.

Remove all power and remove the cover of the dimmer pack. Locate and change jumper or dipswitch settings on the firing card as indicated in the following section.

Softstart

The Softstart mode of operation forces at least a 1/10th second delay between the output being full off to the output being full on to allow a more gradual warming of the lamp filaments. Thermal shock and inrush currents are reduced thereby increasing lamp life. Softstart should not be used when quick dimmer response is desired such as chasing.

To activate Softstart; remove the jumper block from the pin marked J1 on the firing card or move internal dipswitch S10 to the off position. Replacing the jumper block or turning the switch on will deactivate Softstart.



NOTE: The channels of the DDS rack dimmer pack configured for NON DIM operation will not be affected by softstart.

Non Dim Channels (Relay Mode)

Any of the channels of the DDS rack dimmer pack may be configured as NON DIM channels. This will cause the output of the channel to go to full on whenever the input signal is over 15%. When the input signal drops to less than 10%, the channel output goes to full off. This is the equivalent of a zero-crossing solid state relay.

To configure a channel for NON DIM operation simply remove the jumper block from the pins on the firing card as indicated or turn the switch indicated OFF. Replacing the jumper block or turning the switch ON will restore dimming operation.

CHANNEL	SWITCH	JUMPER	CHANNEL	SWITCH	JUMPER
1	S1	J10	2	S2	J9
3	S3	J8	4	S4	J7
5	S5	J6	6	S6	J5
7	S7	J4	8	S8	J3

SWITCH OR JUMPER OFF = NON DIM

SWITCH OR JUMPER ON = DIMMER

AUTO SEQUENCING MODE

The DDS rack dimmers can be configured to perform stand alone Automatic Sequencing in place of Channel Level Memory. This is useful for lighting displays and show windows. The eight channels will automatically fade from one to another in a preprogrammed pattern and time selected by the front panel dipswitch whenever dipswitch #10 is down and no multiplex signal is detected. The Analog control input will continue to operate while the dimmer is sequencing.

To enable Automatic Sequencing Mode remove jumper from position J2 or turn INTERNAL dipswitch S9 to OFF.

Front Panel Dipswitch settings

STEP TIME	SWITCH 1,2,3	PATTERN	SWITCH 4,5,6
1 SECOND	OFF,OFF,OFF	SEQUENCE	OFF,OFF,OFF
3 SECOND	ON,OFF,OFF	ODD / EVEN SEQUENCE	ON,OFF,OFF
5 SECOND	OFF,ON,OFF	PAIRED SEQUENCE	OFF,ON,OFF
10 SECOND	ON,ON,OFF	ODD / EVEN ALT	ON,ON,OFF
15 SECOND	OFF,OFF,ON	OUT / IN SEQUENCE	OFF,OFF,ON
30 SECOND	ON,OFF,ON	BUILD	ON,OFF,ON
45 SECOND	OFF,ON,ON	BUILD +	OFF,ON,ON
60 SECOND	ON,ON,ON	RANDOM	ON,ON,ON

Dipswitch # 7 on causes all above sequences to ping-pong.

INSTALLATION and OPERATION TIPS

Care should always be taken to:

- 1) Keep all AC wiring away from control wiring.
- 2) We also recommend powering up and performance checks be done one unit at a time. This can be a real time saver should problems arise thus eliminating unnecessary isolation techniques to resolve the problem.

Technical Support

If addition help or service is needed, contact your dealer or the NSI Technical Services Hotline: (503) 682-6228.

WARRANTY

NSI Corporation Limited Warranty

NSI Corporation warrants new electronics products to be free from defective materials and workmanship for a period of one (1) year from the date of purchase to the original owner when purchased from an authorized NSI dealer.

The purchaser is responsible for completing and mailing to NSI, within 15 days of purchase, the warranty registration card enclosed with each product. NSI products that have been subject to accident, alteration, abuse, or defacing of the serial number are not covered by this warranty. The normal wear and tear of items such as knobs, jacks, and switches are not covered under this warranty.

If your NSI product requires service during the warranty period, NSI will repair or replace, at its option, defective materials provided you have identified yourself as the original owner of the product to NSI or any authorized NSI dealer. Transportation charges to and from an authorized dealer or the NSI factory for repair shall be the responsibility of the owner. All products returned to NSI must have factory authorization for return prior to shipping.

NSI Corporation is not liable for any incidental or consequential damages resulting from defect or failure other than repairs of the NSI product subject to the terms of this warranty. This warranty gives you specific legal rights, and you may have other rights which vary from state to state. This warranty is expressly in lieu of all other agreements and warranties expressed or implied except as may be otherwise required by law.

Date	Revision
6/28/96	Manual update for external temp cal as per rel 1.41

**DO NOT INCLUDE THIS PAGE WITH
THE COPIES**